



U.S. Department  
of Transportation

Federal Highway  
Administration

July 26, 1999

400 Seventh St., SW,  
Washington, DC. 20590

Refer to: HMHS

Mr. Mark L. Baum  
Montana Department of Transportation<sup>1</sup>  
Construction Bureau  
Specification Section  
PO Box 201001  
Helena, Montana 59620-1001

Dear Mr. Baum:

Thank you for your letter of January 19 requesting Federal Highway Administration (FHWA) acceptance of the Montana Portable Sign Support trailer as a crashworthy traffic control device for use in work zones on the National Highway System under the provisions of National Cooperative Highway Research Program (NCHRP) Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features." Your letter referenced the crash test report by the FHWA's Federal Outdoor Impact Laboratory dated December 1998.

FHWA guidance on crash testing of work zone traffic control devices is contained in two memoranda. The first, dated July 25, 1997, titled "Information: Identifying Acceptable Highway Safety Features," established four categories of work zone devices: Category I devices were those lightweight devices which could be self-certified by the vendor, Category II devices were other lightweight devices which needed individual crash testing, Category III devices were barriers and other fixed or massive devices also needing crash testing, and Category IV devices were trailer mounted lighted signs, arrow panels, etc. The second guidance memorandum was issued on August 28, and is titled "INFORMATION: Crash Tested Work Zone Traffic Control Devices." This recent memorandum lists devices that are acceptable under Categories I, II, and III. The Montana Portable Sign Support trailer is a category III device because of its mass, but because it is not anchored to the ground we can take advantage of the NCHRP Report 350 provision to omit the low-speed test as there is no "breakaway" mechanism to activate.

Full-scale automobile testing was conducted on your state's portable sign support. Two examples of the portable sign support were tested, one head-on and the next at 90 degrees, as called for in our guidance memoranda. These orientations also conform to usage in the field. The portable sign trailer consisted of a 75mm box tube axle 1525mm long. Welded to each end of the box tube was a small block with a spindle attached. A wheel-tire assembly was mounted to each spindle. At the center of the axle, a 50mm box sleeve was welded vertically to accept a 50mm steel tube sign post. A 1920mm tongue was attached to the axle to allow for easy towing of the sign support. The tongue and sign post sleeve were reinforced with 50mm steel angle braces. A

50 mm ball hitch was also mounted to the axle to allow for tandem towing of multiple sign trailers. The vertical sign post was inserted into the trailer sleeve and a 1675 mm square aluminum sign panel was attached using four hardware quality S-mm bolts with a flat washer on each side and fastened with an 8 mm nut. All sign materials, excluding the tires and sign panel, were fabricated from ASTM A36 steel. The total weight of the portable sign trailer sign post was 113 kg. Drawings of the trailer are enclosed. The two crash tests are summarized in the table below.

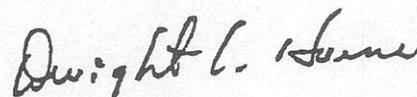
Test Number	98F008	98F009
Vehicle Inertial Mass	819 kg	818 kg
Speed: Primary (trap)	100.4 km/h	99.1 km/h
Speed: 16-mm film	99.1 km/h	98.0 km/h
Occupant Impact Speed	3.3 m/s	3.5 m/s
Vehicle crush	159 mm	249 mm
Occupant Compart. Intrusion	none	none
Windshield Damage	cracked, no loss of visibility	cracked, no loss of visibility
Test article Damage	destroyed	destroyed

During the tests the damage to the test vehicles was minor. Although the windshield was cracked in each test there was no occupant compartment intrusion and no perceived loss of visibility or vehicle control. The vehicles maintained their stability after the collision with the sign trailer and continued to travel with their original trajectory. There was no indication that the vehicle, vehicle debris sign trailer, and trailer debris would impose a safety risk to oncoming traffic. The sign trailer performed in a predictable manner during each test. There was no substantial occupant compartment deformation observed, nor did any test article debris show potential for penetrating the occupant compartment. The results of this testing met the FHWA requirements and, therefore, the Montana Portable Sign Support trailer is acceptable for use on the National Highway System under the range of conditions tested.

Our acceptance is limited to the crashworthiness characteristics of the trailer and does not cover its structural features nor conformity with the Manual on Uniform Traffic Control Devices. Presumably, you will supply potential users with sufficient information on design and installation

requirements to ensure proper performance. We anticipate that other States may ask your for your design details and specifications to ensure that their trailers are constructed with essentially the same physical and mechanical properties, construction details, and geometry as that submitted for acceptance. To prevent misunderstanding by others, this letter of acceptance, designated as number WZ-19, shall not be reproduced except in full.

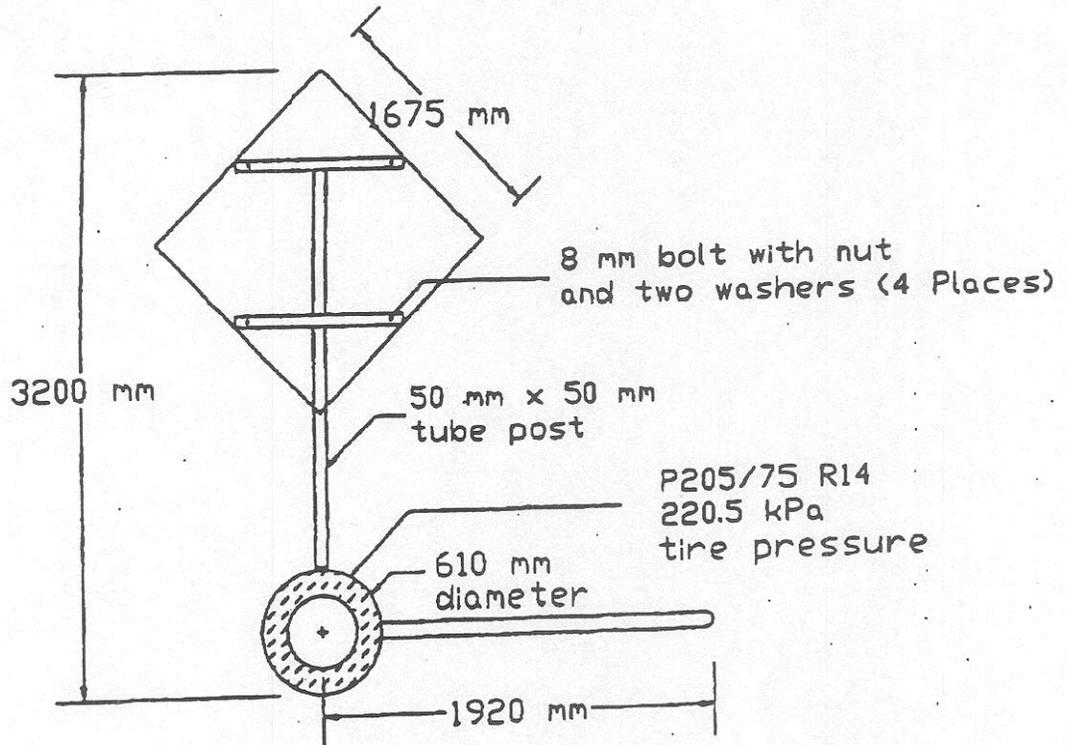
Sincerely yours,



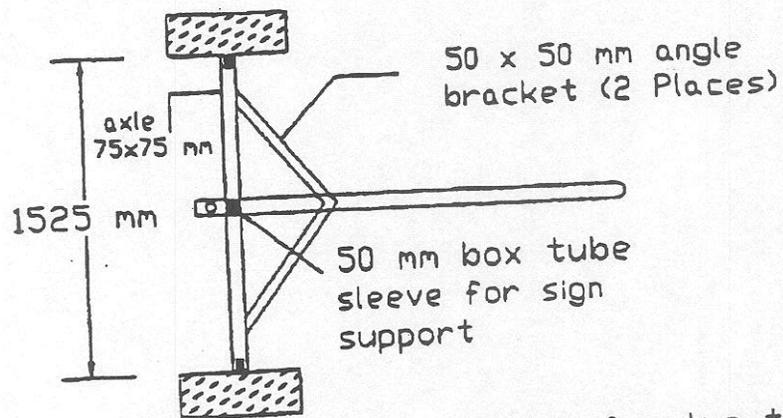
Dwight A. Home  
Office of Highway Safety Infrastructure

Enclosure

# PORTABLE SIGN TRAILER



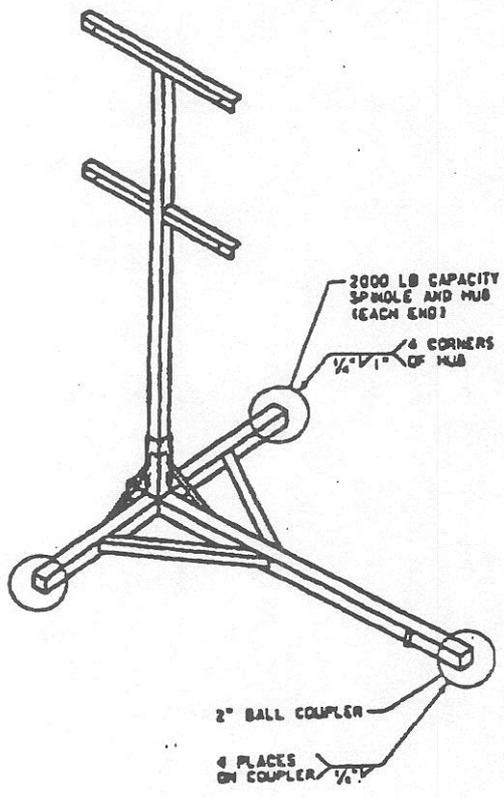
Rear View



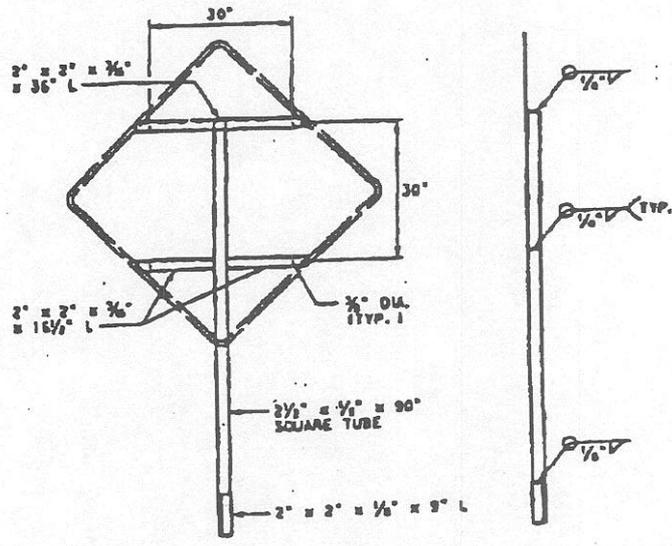
Except for two tires,  
all parts made from  
ASTM A36 Steel

Top View

Figure 3. Sketch of portable sign trailer as tested.

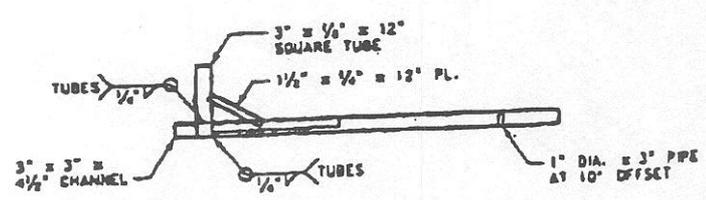


NOTES:  
 THE MAXIMUM WEIGHT OF THE ASSEMBLY IS 250 POUNDS.  
 USE A 14" WHEEL AND TIRE.  
 AUTOMOTIVE AND EQUIPMENT AXLE ASSEMBLIES CANNOT BE USED FOR TRAILER-MOUNTED SIGN SUPPORTS.  
 SEE PAGE 11 FOR METRIC CONVERSION

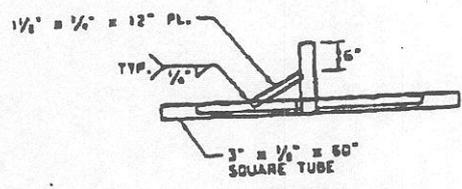


FRONT RIGHT

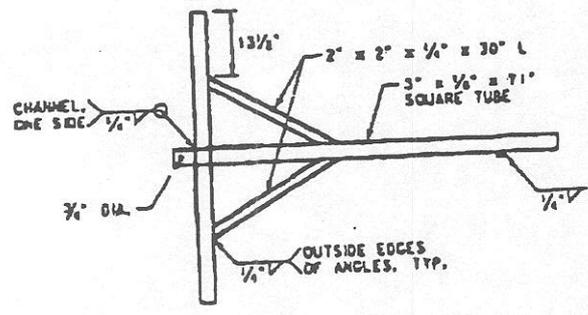
SIGN SUPPORT



FRONT



RIGHT



TOP

TRAILER

DETAILED DRAWING	
REFERENCE STANDARD SPEC. SECTION 618.715	DWG. NO. 618-02
PORTABLE SIGN SUPPORT ASSEMBLY	
EFFECTIVE:	
MONTANA DEPARTMENT OF TRANSPORTATION	MONTANA CADD

Figure 4. Design drawing of portable sign trailer.